Bioaccumulation Model Check-In

CPG-EPA Conference Call

December 11, 2018

623728

Meeting Objectives

- Review final FB4 inputs
- Review growth/consumption rate equations
  - Need floor/ceiling on growth rate?
- Discuss initial calibration work

Final Percent Growth per Year and Year-End Weights

LPRSA Species	Starting Weight (kg)	One-Year Percent Increase	Year-End Weight (kg)	Basis
Small forage fish	0.0027	230%	0.0090	VBGF (FishBase) and LPRSA data
Blue crab	0.14	69%	0.24	Generic life history estimate using LPRSA data (per J. Clough)
Carp	3.1	17%	3.6	VBGF (FishBase) and LPRSA data
Catfish	0.88	14%	1.0	VBGF (FishBase) and LPRSA data
White perch	0.094	31%	0.12	VBGF (FishBase) and LPRSA data
Bass	0.29	73%	0.50	VBGF (FishBase) and LPRSA data

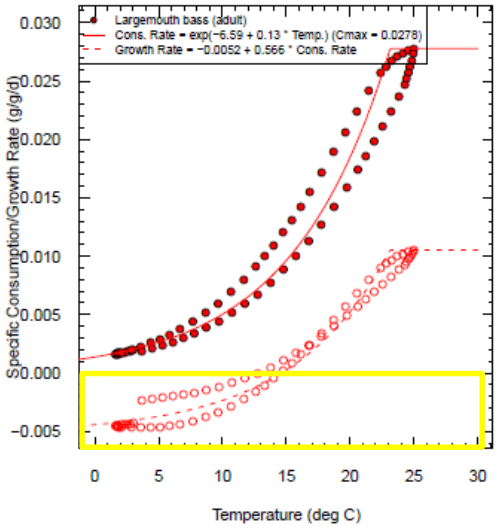
Percent Growth per Year

LPRSA Species	Gewurtz	VBGF (FishBase)	J.Clough Generic Life History Estimate
Small forage fish	233%	232% (7)	173%
Small eel	75%	--	17%
Blue crab	71%	--	69%
Carp	35%	17% (15)	19%
Catfish	48%	14% (1)	15%
White perch	81%	31% (2)	43%
Large eel	59%	--	13%
Bass	62%	73% (54)	29% (*64%*)

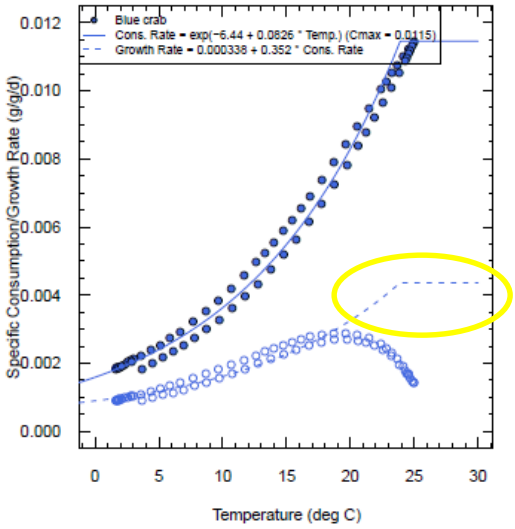
No FB4 model is available for American eel. Based on similarities in diets and growth rates, catfish was selected as the surrogate for the development of the growth and consumption rate equations.

Growth and Consumption Rate Equations

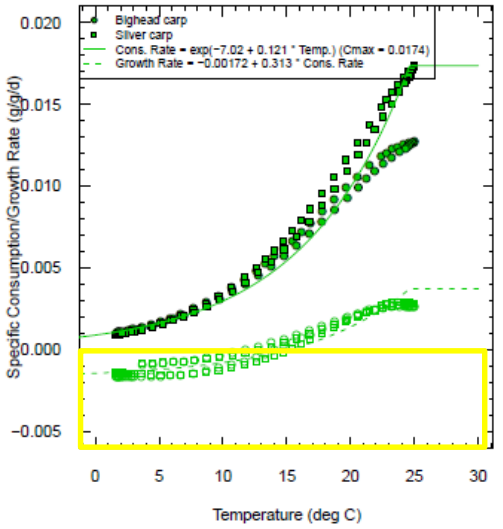
Bass



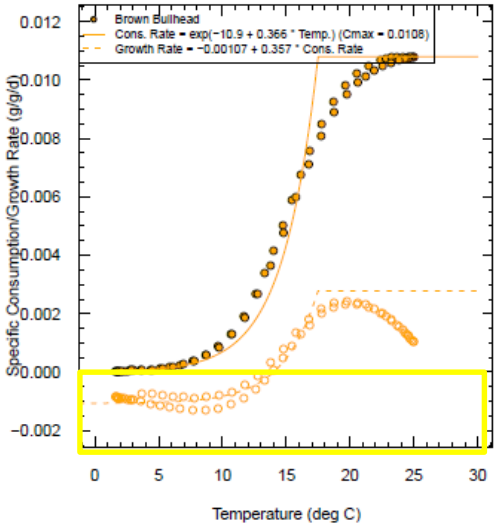
Blue crab



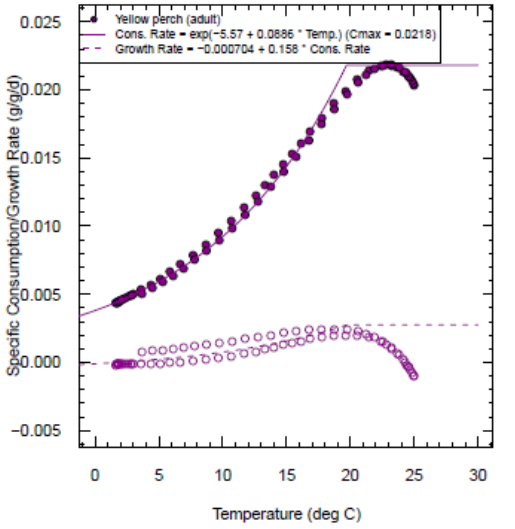
Carp



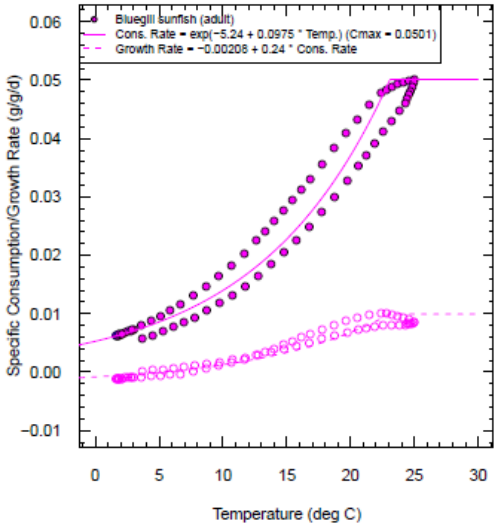
Catfish



Perch

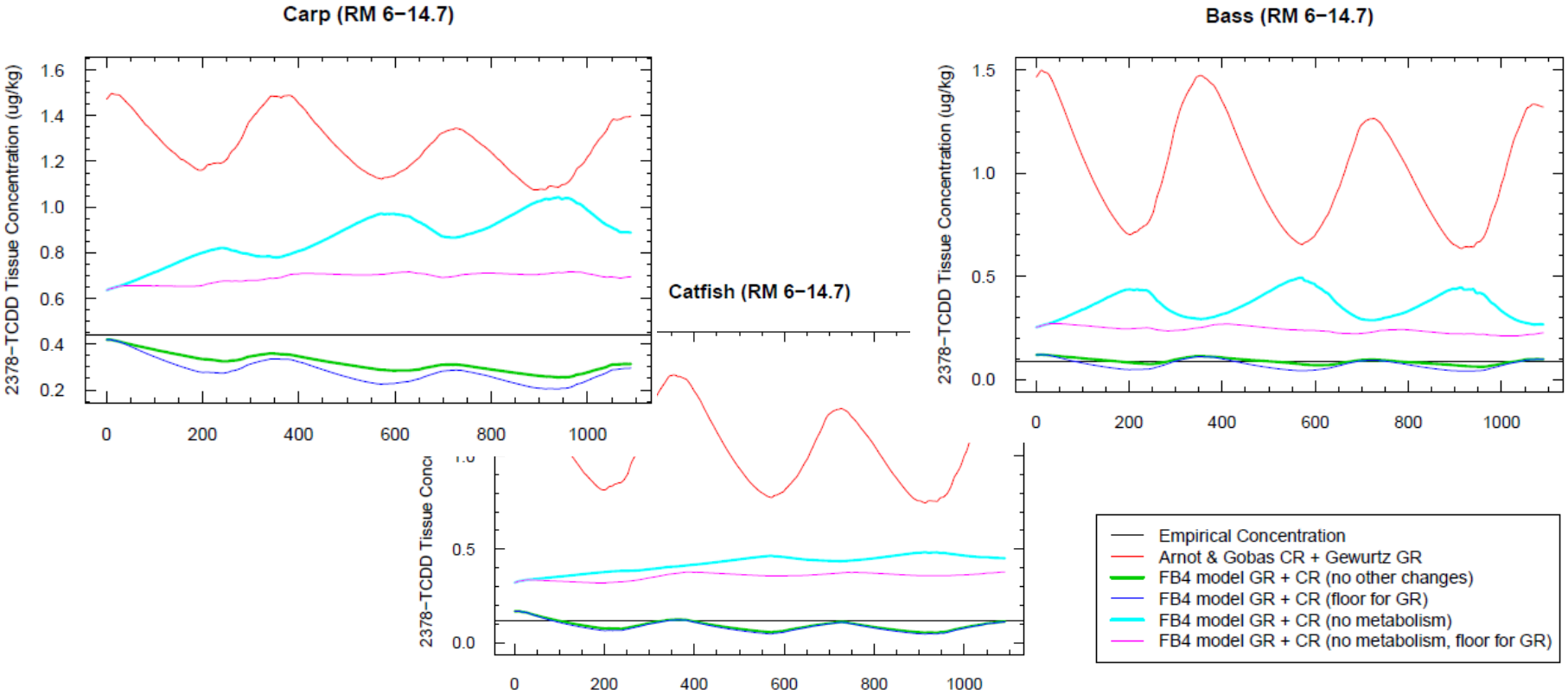


Small forage fish

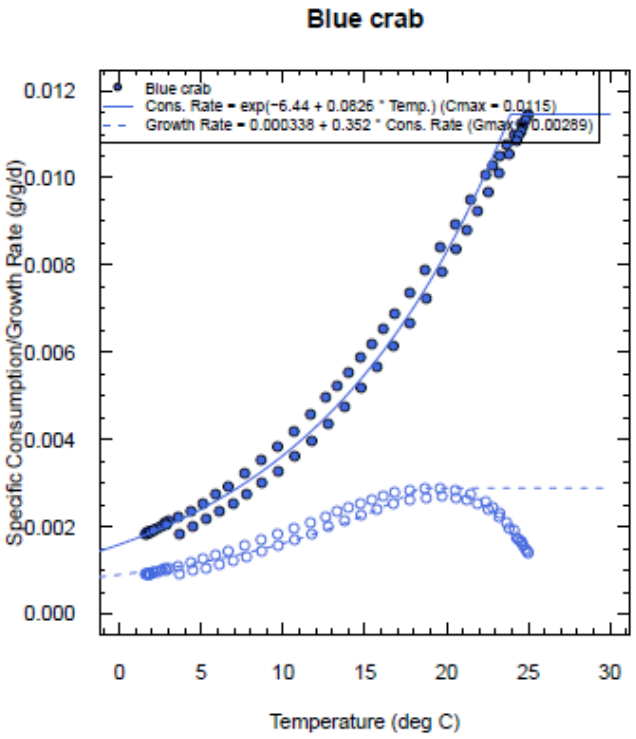


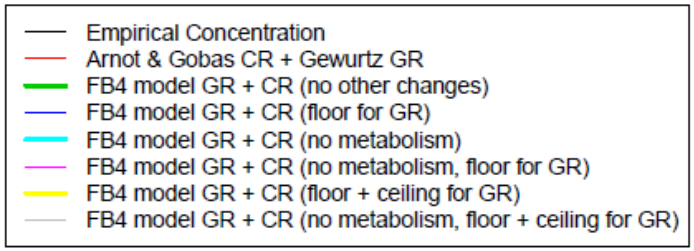
Growth Rate – Floor?

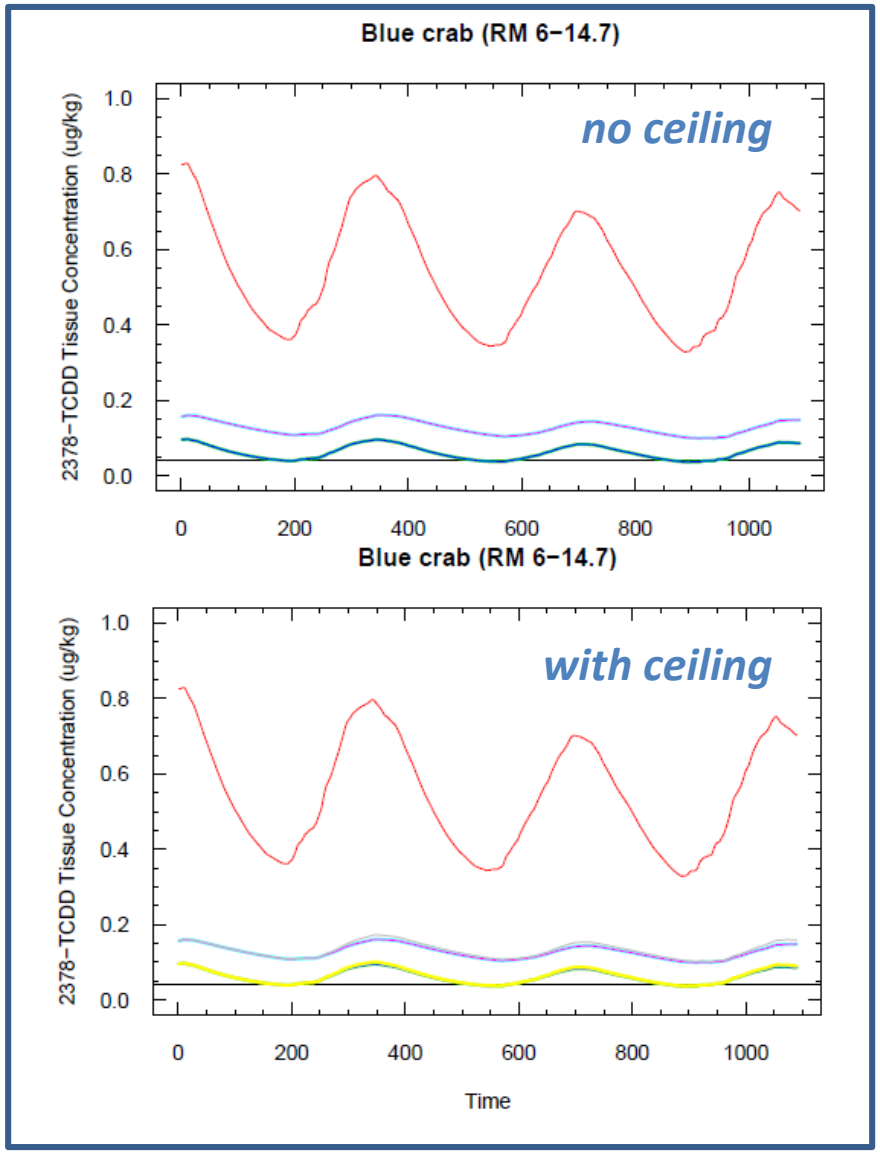
- Model predictions are generally the same, but some differences (e.g., bass and carp)
- Occurs in cases when growth rates go negative.



Growth Rate – Ceiling?

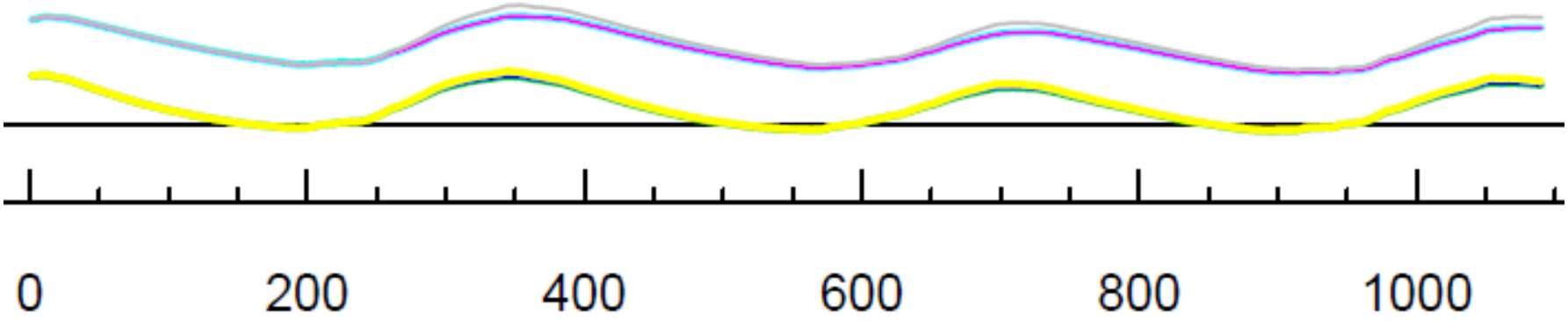






Growth Rate Ceiling

- Zoomed in view (blue crab + TCDD):



- Conclusion –
  - Ok to add if it helps provide comfort with bounding possible growth rates.
  - But doesn't make a big difference in the model.

Initial Calibrated Parameters

- K_{OW} values = values from CFT model
- E_D values = defaults (based on K_{OW})
- Other changes that were agreed upon in June:

Parameter	Nom-inal	Range	Select-ed	Selected Value Min----------(Nominal)----------Max
Weight of DEPs (RM 6-14.7)	36 mg	0.12-400 mg	1 mg	0.1[illegible]-----(36)----------400
Invert dietary AE of NLOC/NLOM	0.75	0.15-0.96	0.4	0.15-------★---------(0.75)-------0.9
Percent of sediment in DEP diet (RM 6-14.7 and 14.7-Dam)	89%	70-100%	70% (min)	7[illegible]%----------(89%)--------100%
DO Saturation (RM 6-14.7)	85%	71-97%	80%	71%---------★--(85%) ----------97%

Initial Calibration Work

LPRSA Species	RM 6-14.7 Modeling Area				
	2378-TCDD		TetraCB	1234678–HpCDF	
	K_M = 0	K_M = default	K_M = default	K_M = 0	K_M = default
Small forage fish	over (7)	over (3)	under (3)	over (5)	under (2)
Small eel	over (25)	over (8)	under (2)	over (20)	under (2)
Blue crab	over (2)	over (4)	under (2)	over (7)	under (4)
Carp	over (2)	under (2)	under (2)	over (5)	under (4)
Catfish	over (3)	1	under (2)	over (15)	under (2)
White perch	over (3)	1	under (4)	over (35)	under (2)
Large eel	over (10)	over (3)	under (2)	over (9)	under (3)
Bass	over (3)	1	under (3)	over (10)	under (2)

Calibration Focus

- 2378-TCDD:
  - Model generally over-predicting with default K_M
  - Reduce bioaccumulation (evaluate K_{OW} and E_D as well as species-specific K_M values)
- TetraCB:
  - Model generally under-predicting
  - Increase bioaccumulation (evaluate K_{OW} and E_D)
- 1234678−HpCDF:
  - Model under-predicting with default K_M
  - Increase bioaccumulation (evaluate K_{OW} and E_D as well as species-specific K_M values)

Next Steps

- Finalize changes to model code.
- Continue working on model calibration and updating report documentation.